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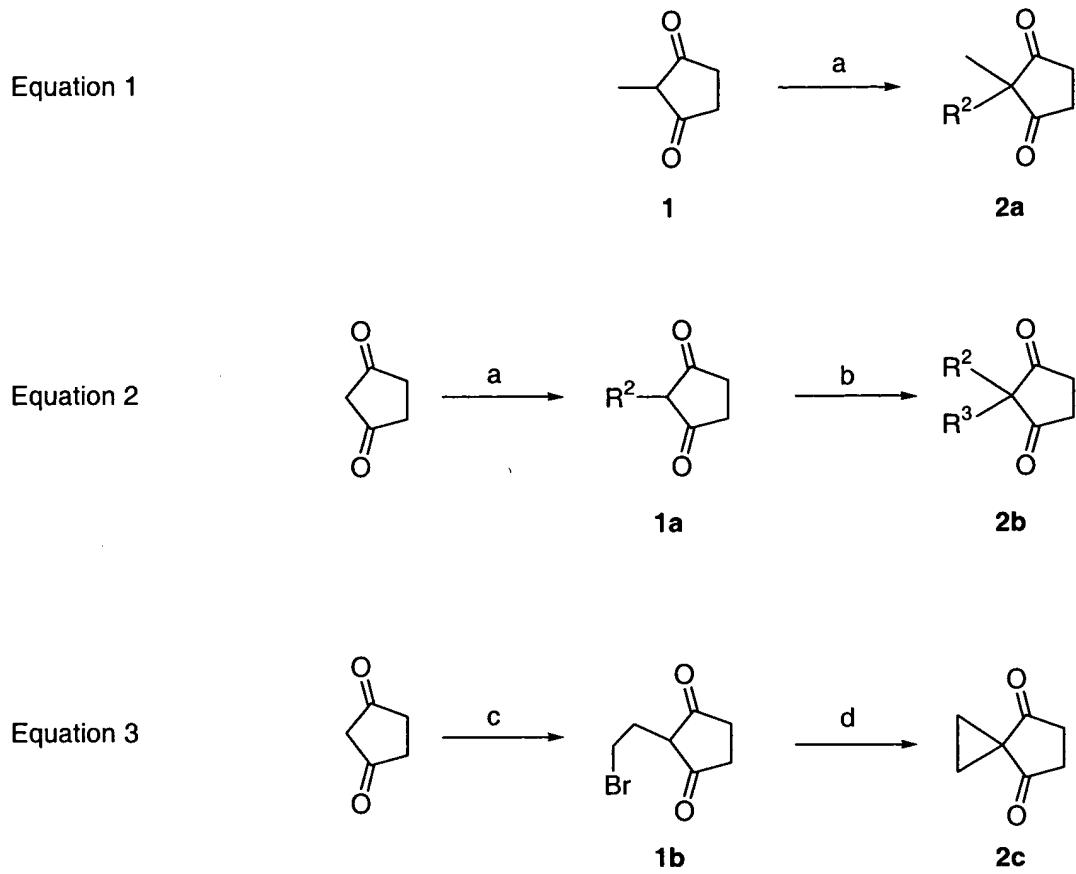
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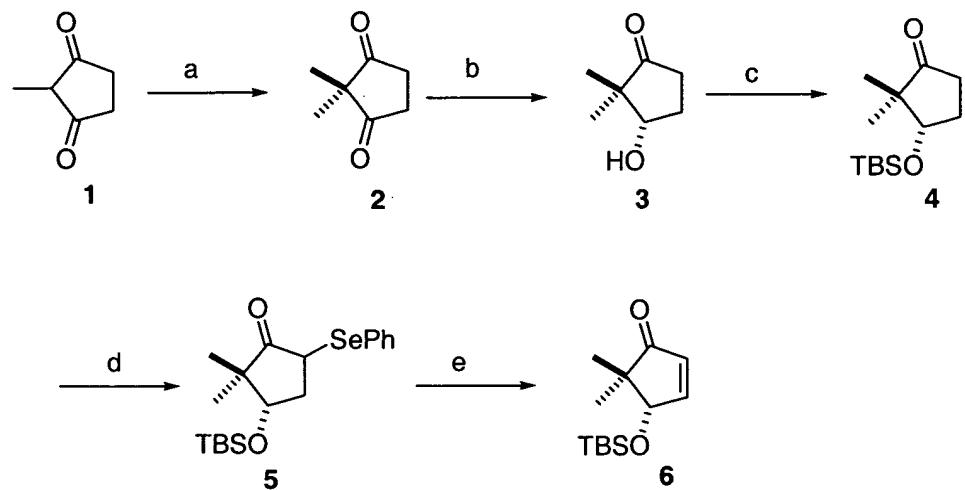
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Scheme 1



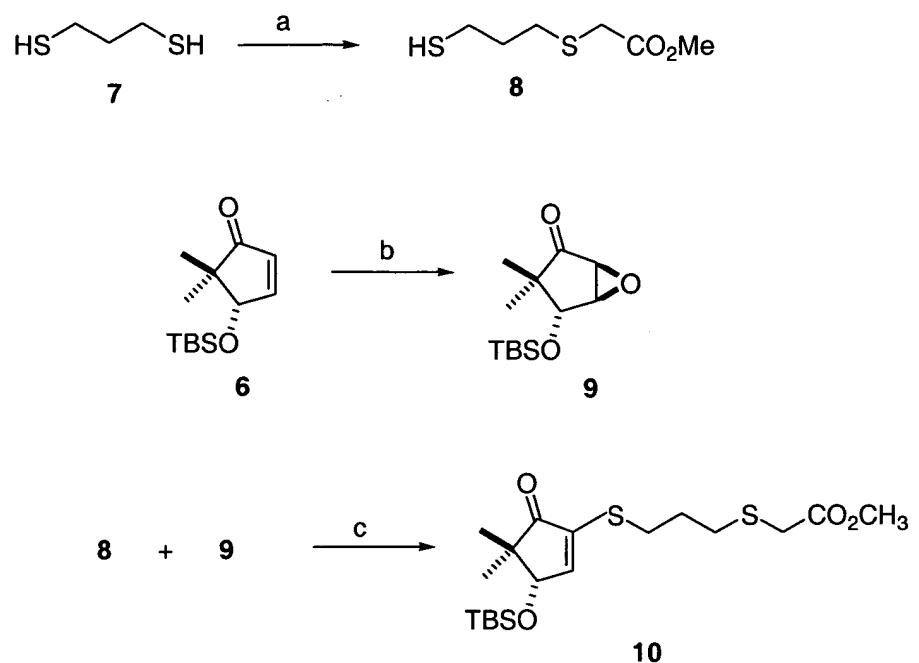
(a) KOH, I-R², dioxane/H₂O; (b) KOH, I-R³, dioxane/H₂O; (c) KOH, 1,2-dibromoethane, dioxane/H₂O; (d) KOH, dioxane/H₂O.

Scheme 2



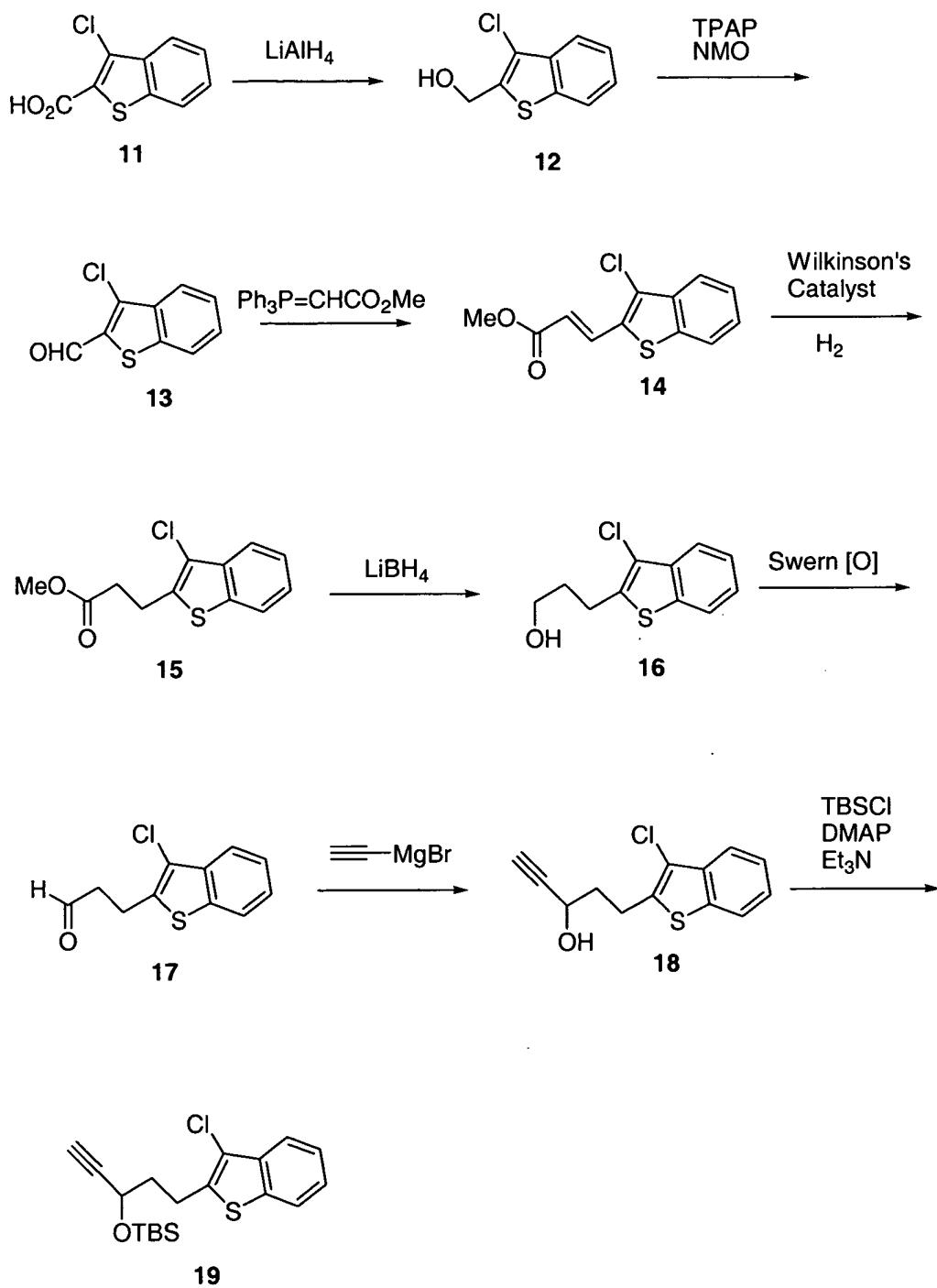
(a) KOH, MeI, dioxane/H₂O; (b) Baker's Yeast, D-glucose, H₂O; (c) TBSOTf, 2,6-lutidine, CH₂Cl₂; (d) LDA, THF; PhSeCl; (e) 30% H₂O₂, CH₂Cl₂.

Scheme 3

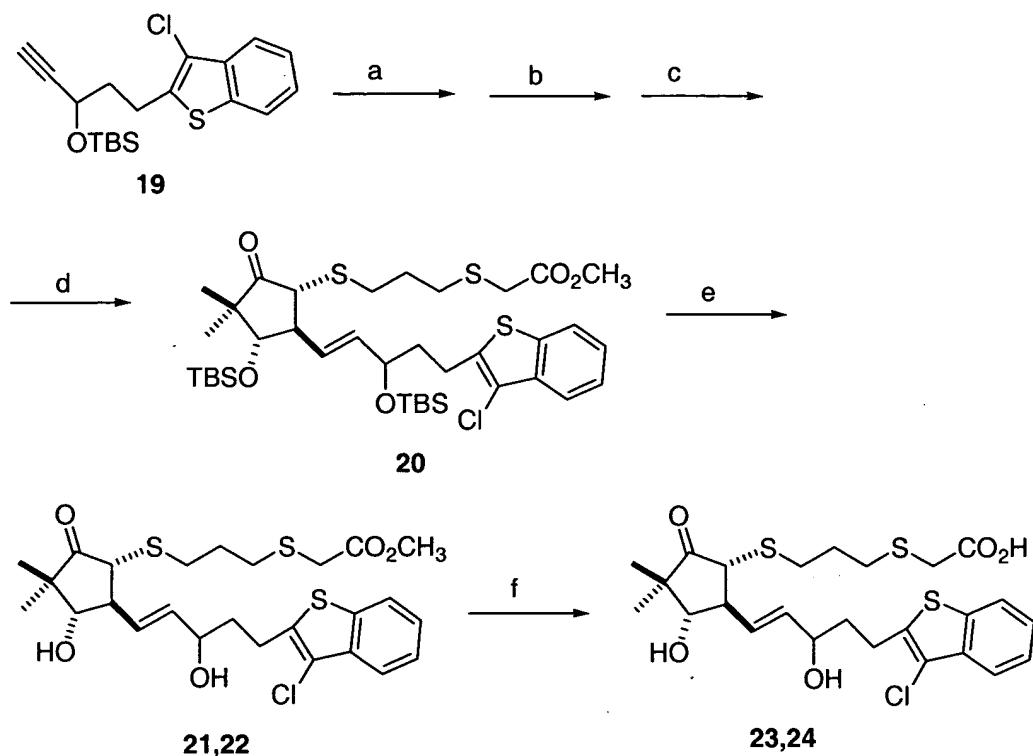


(a) NaH, BrCH₂CO₂CH₃; (b) H₂O₂, NaOH, MeOH; (c) basic Alumina, CH₂Cl₂.

Scheme 4

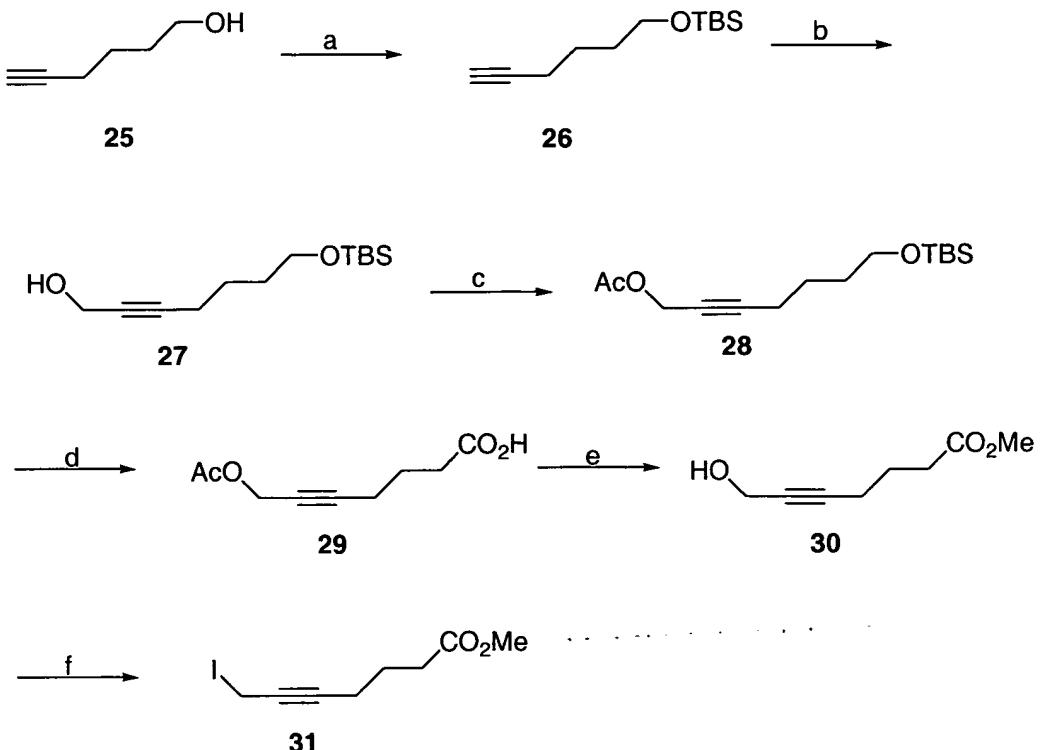


Scheme 5



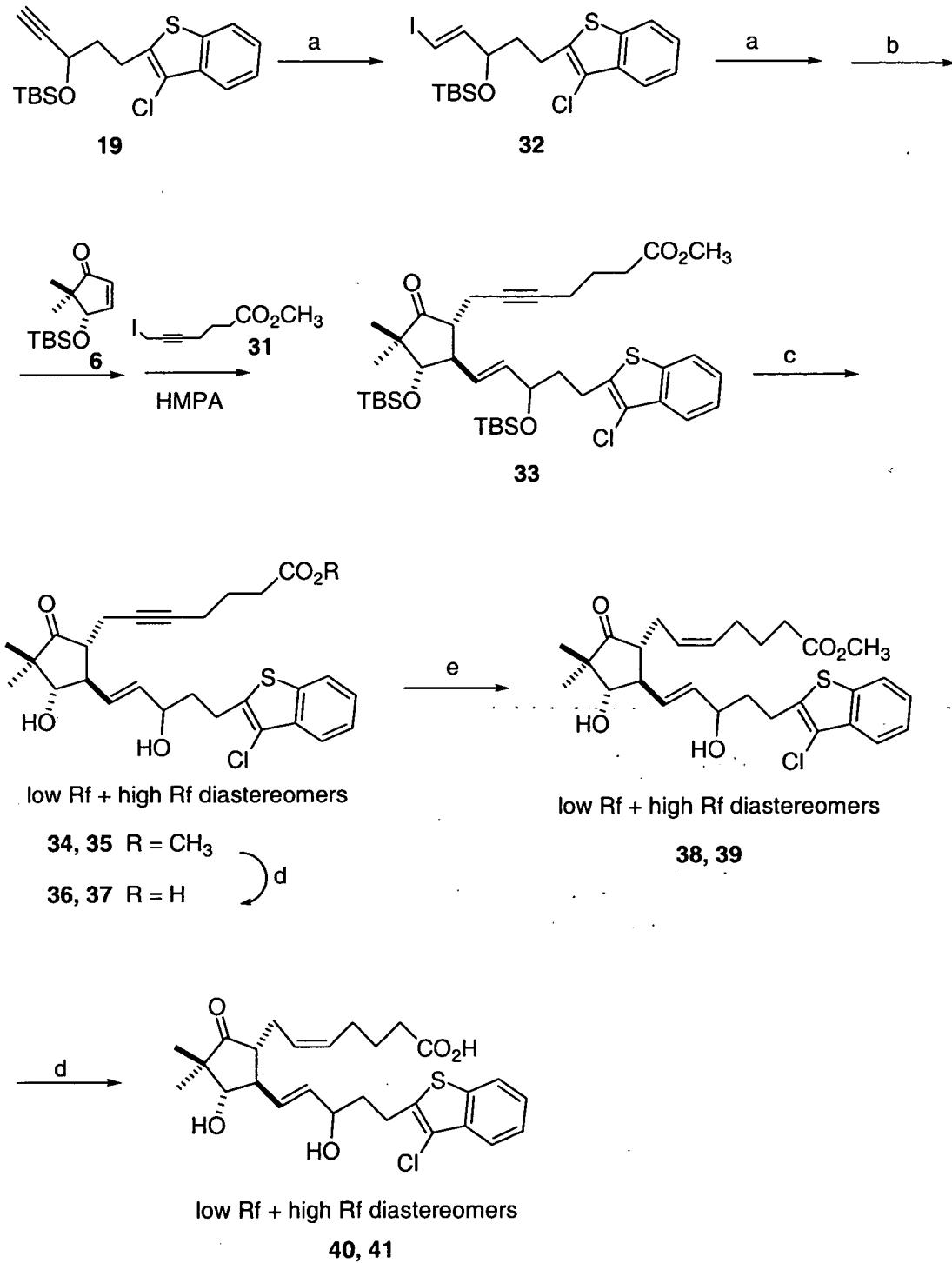
(a) Cp_2ZrHCl , THF; (b) MeLi , Et_2O -78 °C; (c) lithium 2-thienycyanocuprate;
 (d) enone **10**, THF -78 °C; (e) HF-pyridine, CH_3CN ; separate diastereomers
 (f) rabbit liver esterase, phosphate buffer, CH_3CN .

Scheme 6



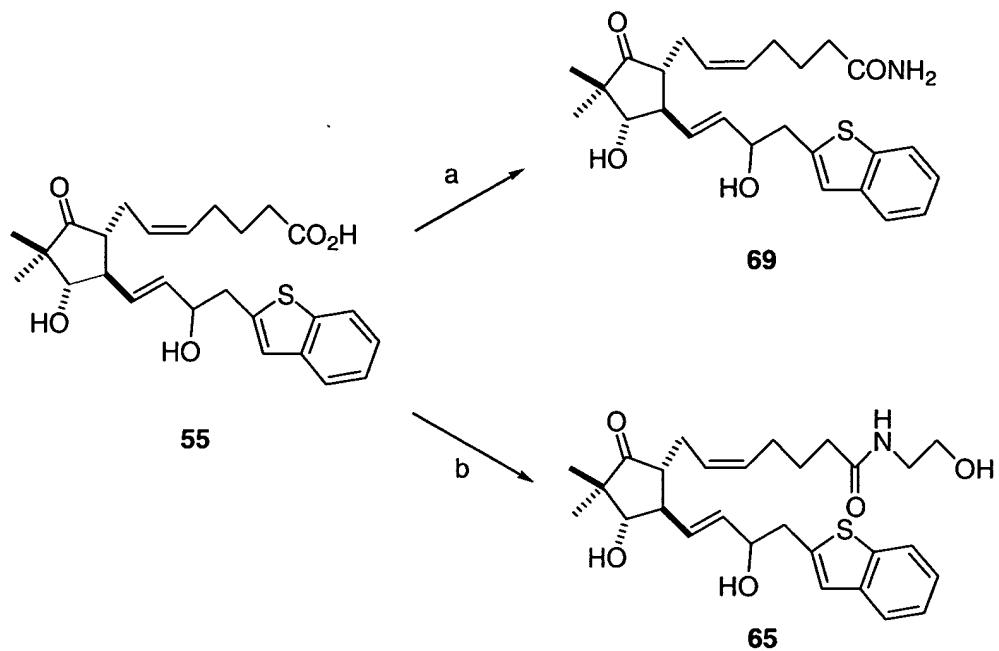
(a) TBSCl, etc.; (b) *n*-BuLi; DMF; (c) Ac₂O, pyridine; (d) Jones oxidation; (e) MeOH, AcCl;
(f) PPh₃, I₂, imidazole, CH₂Cl₂.

Scheme 7



(a) *t*-BuLi, THF -78 °C; (b) Me₂Zn; (c) HF-pyridine, CH₃CN; separate diastereomers; (d) rabbit liver esterase, pH 7.2 phosphate buffer, CH₃CN; (e) NiCl₂, NaBH₄, ethylenediamine, H₂, THF;

Scheme 8



(a) $\text{ClCO}_2\text{CH}_2\text{CH}_3$, Et_3N , CH_2Cl_2 ; NH_4OH (aq);

(b) EDCI, N-hydroxysuccinimide, $\text{H}_2\text{NCH}_2\text{CH}_2\text{OH}$, DMF.